Fact Sheet

Permittee Name:	U.S. Bureau of Reclamation
Permit No.:	CO-0021717
Mailing Address:	11056 W. County Road 18E Loveland, Colorado 80537-9711

FACILITY INFORMATION

Name of Facility:	U.S. Bureau of Reclamation Leadville Mine Drainage Tunnel (LMDT) Treatment Plant
Responsible Official:	Mike Collins, Area Manager
Contact Person:	Brad Littlepage
Telephone:	(719) 486-2035

Facility Location

The LMDT Treatment Plant is located in Lake County, Colorado, approximately one mile north of Leadville, Colorado (see Figure 1 below).

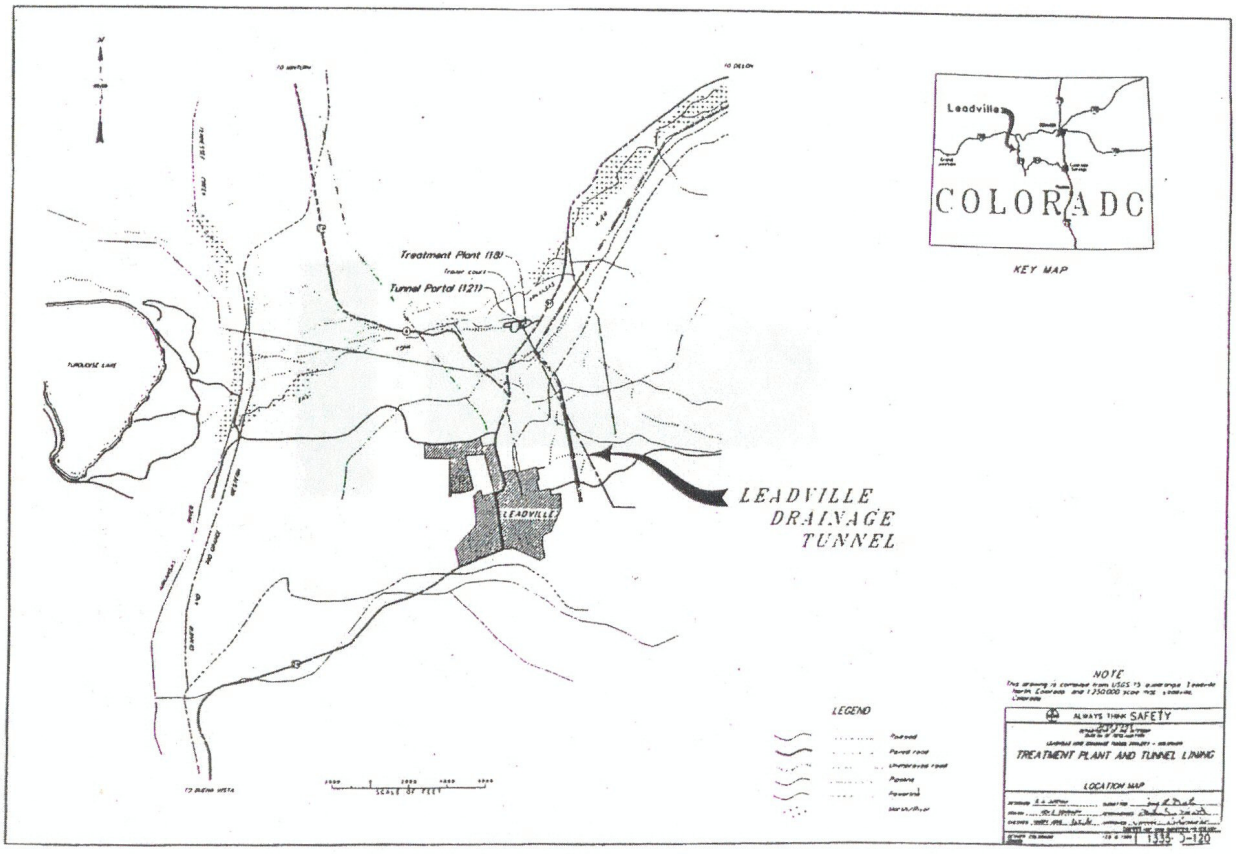


FIGURE 1. Leadville Mine Drainage Tunnel Location Map

Facility and Regulatory History

The U.S. Bureau of Mines (USBM) began construction of the LMDT during World War II under the direction of the War Production Board. The tunnel was constructed to drain accumulated mine water seepage from underground workings in the Leadville area, thus allowing further exploitation of the mineral reserves. Due to the exhaustion of appropriated funds, the tunnel construction ceased in 1945.

Metal demands resulting from the Korean conflict provided the impetus for a second project to extend the tunnel. The tunnel was completed in 1952 at a total length of 11,299 feet.

In 1959, the U.S. Bureau of Reclamation (BOR) secured title to the LMDT from the USBM. BOR intended to use the tunnel drainage as part of the water supply for the Frying Pan-Arkansas Water Project. Water rights conflicts precluded the use of the tunnel drainage for that purpose.

The portal and first 635 feet of the tunnel was excavated through glacial deposits and terrace gravel. The unconsolidated nature of these materials contributed to structural collapses in the first several hundred feet of the tunnel. BOR reconditioned and placed a bulkhead in this portion of the tunnel in 1980. The tunnel effluent contains high concentrations of metals, such as zinc, iron and cadmium was contributed to the Arkansas River.

The high metals concentrations within the streams greatly diminished aquatic life populations. However, upon the construction of both the LMDT Treatment Plant and the Yak Tunnel Treatment Plant, water quality in the stream segments has greatly improved, supporting a viable environment for aquatic life once again.

Environmental Protection Agency (EPA) issued National Pollutant Discharge Elimination System (NPDES) Permit Number CO-0021717 to the BOR authorizing discharge of tunnel effluent to the East Fork of the Arkansas River in 1975 and 1979.

In 1980, EPA and BOR signed an Administrative Stipulation and Agreement which contained a schedule for plugging the tunnel. The BOR completed only two of the scheduled activities. EPA re-issued NPDES Permit Number CO-0021717 in September 1981 which retained effluent limitations listed in the 1975 issued permit.

In September 1984, BOR and EPA signed another Stipulation and Agreement for bringing the Tunnel effluent into compliance. The Agreement included a schedule for identifying a preferred compliance alternative.

BOR requested the renewal of Permit Number CO-0021717 in June 1986. EPA administratively extended the permit until a renewal permit was issued.

In 1987, the BOR, with the concurrence of EPA, tentatively selected a mine water treatment plant as the alternative to bring the tunnel effluent into compliance with the Clean Water Act (CWA).

In 1989, a Federal Facility Compliance Agreement was signed that required BOR to design, construct and operate a mine water treatment system to meet set effluent limitations. The targeted effluent limitations were based upon the State of Colorado's effective stream use classification for cold water aquatic life, the State of Colorado's proposed stream criteria, EPA's Effluent Guidelines for Ore Mining and Dressing Point Source Category (40 CFR 440), the National Ambient Water Quality Criteria ("The Gold Book"), and a loading analysis performed on the East Fork of the Arkansas River. The effluent limitations included the following parameters: pH, total zinc, total copper, total lead, total cadmium, total silver, total iron, total manganese and total suspended solids.

In accordance with the 1989 Federal Facility Compliance Agreement, the U.S. BOR Leadville Treatment Plant attained operational status by the June 1, 1992 deadline. A revised NPDES Permit Number CO-0021717 was reissued and became effective May 1, 1992. Since the re-issuance of the permit in 1992, the treatment plant has had a good compliance record with only isolated violations, the majority occurring in the early stages of plant operation. A revised NPDES permit was reissued and became effective January 1, 2000. Since the re-issuance of the permit in 2000, the treatment plant has some numeric violations for oil and grease, silver, copper, and mercury (See attachment 1 in Appendix B).

Facility Description

The treatment plant employs two parallel process trains that are designed for an average flow of 2.5 MGD and peak flow of 3.3 MGD. The process starts with initial pH adjustment with Sulfuric Acid to 5.2 and air stripping to remove carbon dioxide. The pH is then adjusted with Sodium Hydroxide to 9.8 or higher to cause precipitation of metal hydroxides. Polymer and recycled sludge from the thickener are added in the Reactor tanks to enhance metals removal. The settling of metal hydroxide sludge takes place in the thickener units, from which excess sludge is removed and stored in holding tanks. Precipitated metal hydroxides are separated from the discharge in a clarifier followed by gravity filtration in tube-type settlers. Clean water then overflows to gravity sand filtration for final polishing. Finally, the pH is adjusted with Sulfuric Acid and the treated water is discharged through outfall 001 to an unnamed drainage way tributary to the East Fork of the Arkansas River.

The sludge settled in the tube settlers is either recycled back to the reaction system or sent to a filter press for further dewatering. Excess sludge is pumped from thickener units to holding tanks for stabilization with trisodium trimercapto-s-triazine, trade name TMT-55. TMT-55 forms strong bonds with metals, specifically reducing the mobility of cadmium which has weak bond formation with the hydroxide and yielding metal hydroxide sludge. (Note: TMT-55 also stabilizes all metals and in theory can meet a thousand year toxicity characteristic leaching procedure (TCLP)). Decant from dewatering is returned to the headworks of the treatment system for further treatment. Dewatered sludge is stored on site in roll-off boxes prior to disposal. If the sludge passes a TCLP test, it is disposed of in a Resource Conservation Recovery Act (RCRA) Subtitle D landfill in Colorado. When a TCLP failure renders the sludge a

hazardous waste, the sludge is sent to a permitted RCRA Treatment Storage and Disposal (TSD) facility in Colorado or Utah.

Description of Discharge

Outfall 001 is the outfall from the U.S. BOR Leadville Treatment Plant prior to contact or admixture with any surface water flows. It is located across the road from the treatment plant. (Outfall located at 39°16'28" latitude and 106°17'19" longitude)

Outfall 002 is the discharge point from the detention pond overflow. This is an emergency discharge location that is only used during bypass or upset conditions. Throughout the duration of the 2000-issued permit, there was no discharge from Outfall 002.

Receiving Water

The receiving water for the discharge from the U.S. BOR Leadville Treatment Plant is an unnamed drainage way tributary to the East Fork of the Arkansas River, in Segment 2a of the Upper Arkansas River Basin. Segment 2a includes the mainstem of the East Fork of the Arkansas River and the Arkansas River from a point immediately above the confluence with Birdseye Gulch to a point immediately above the confluence with California Gulch. Segment 2b is directly downstream of Segment 2a and includes the mainstem of the Arkansas River from a point immediately above California Gulch to a point immediately above the confluence with Lake Fork. Segment 2b is on the State of Colorado's 2006 303(d) list of impaired stream segments for non-attainment of zinc and cadmium water quality standards (See Colorado Regulation #93). The applicable designated use classifications and standards for Segments 2a and Segment 2b are given in Table 1 below:

Table 1: Upper Arkansas River Basin Use Classification and Water Quality Standards

Use Classifications:

Segment 2a*	Segment 2b*
Aquatic Life, Class 1 (Cold)	Aquatic Life, Class 1 (Cold)
Recreation, Class 1a	Recreation, Class 1a
Water Supply	Agriculture
Agriculture	

Standards:

Segment 2a*	Segment 2b*
D.O. = 6.0 mg/L, 7.0 mg/L (sp)	Same as 2a
pH = 6.5 - 9.0	Same as 2a
Fecal Coliform Bacteria = 200/100 ml	Same as 2a
E. Coli = 126/100 ml	Same as 2a

NH_3 (acute) = TVS	Same as 2a
NH_3 (chronic) = 0.02 mg/L as N (unionized)	Same as 2a
Residual Cl_2 (acute) = 0.019 mg/L	Same as 2a
Residual Cl_2 (chronic) = 0.011 mg/L	Same as 2a
Free CN = 0.005 mg/L	Same as 2a
S as H_2S = 0.002 (undissociated)	Same as 2a
Boron = 0.75 mg/L	Same as 2a
Nitrite = 0.05 mg/L as N	Same as 2a
Nitrate = 10 mg/L as N	N/A
Chloride = 250 mg/L	N/A
Sulfate = WS	N/A
Arsenic (chronic) = 50 µg/L (Trec.)	= 100 µg/L (Trec.)
Cadmium (acute/chronic) = TVS(trout)/TVS	TVS(trout)/TVS**
Chromium(III)(acute)= 50 µg/L (Trec.)	N/A
Chromium (III) (chronic) = N/A	= 100 µg/L (Trec)
Chromium (VI)(acute/chronic)= TVS/TVS	Same as 2a
Copper (acute/chronic) = TVS/TVS	Same as 2a
Iron (chronic) = 1000 µg/L (Trec.)	= 1000 µg/L (Trec.)
Iron (chronic) = WS(dis)	N/A
Lead (acute/chronic) = TVS/TVS	Same as 2a
Manganese (acute/chronic) = TVS/TVS	Same as 2a
Manganese (chronic) = WS(dis)	N/A
Mercury (chronic)= 0.01 µg/L (tot)	Same as 2a
Nickel (acute/chronic) = TVS/TVS	Same as 2a
Selenium (acute/chronic) = TVS/TVS	Same as 2a
Silver (acute/chronic) = TVS/TVS (trout)	Same as 2a
Zinc (acute/chronic) = TVS/TVS	Same as 2a**

TVS - Table Value Standard; numerical criteria set forth in Table III from the State of Colorado's Basic Standards and Methodologies for Surface Water, Colorado Water Quality Control Commission Regulation No.31.

*From "Colorado Water Quality Control Commission Regulation No. 32. Classifications and Numeric Standards for Arkansas River Basin" as amended December 12, 2005.

**For Segment 2b, there are temporary modifications for Cd(ch) = 1.3, no Zn(ac), and Zn(ch)=270. The temporary modifications expiration date is December 31, 2007.

Fe (ch) = WS (dis), Mn (ch) = WS (dis), and SO_4 = WS abbreviations mean: For all surface waters with an actual water supply use, the less restrictive of the following options shall apply as numerical standards, as specified in the Basic Standards and methodologies at Colorado Regulation 31.11(6) (from 32.6 Tables (2) of Classifications and Numeric Standards for Arkansas River Basin, Regulation No. 32):

(i) existing quality as of January 1, 2000; or

(ii) Iron = 300 µg/L (dissolved)
Manganese = 50 µg/L (dissolved)
SO_4 = 250 mg/L

Dissolved metals standards are required to be analyzed based on the "potentially dissolved" method, See Colorado Regulation 31.14(7). (Colorado Basic Standards and Methodologies, Regulation No. 31).

Effluent Limitations and Monitoring Requirements

Seasonal effluent limitations and monitoring requirements are presented below in Table 2 and Table 3. Corresponding effluent monitoring requirements are presented in Table 4. Table 5 presents special upstream and downstream monitoring requirements. The effluent limitations and monitoring requirements have been derived from the State of Colorado's Water Quality Control Commission Regulation No. 31, *The Basic Standards and Methodologies for Surface Water*, State of Colorado's Water Quality Control Commission Regulation No. 32, *Classifications and Numeric Standards for Arkansas River Basin*, State of Colorado's Water Quality Control Commission Regulation No. 62, *Regulations for Effluent Limitations*, and previous permit limitations under antibacksliding provisions of 40 CFR122.44(l).

Table 2. High-Flow Season Permit Effluent Limitations

High-Flow Season (May - August)	**Discharge Limitations**		
Effluent Characteristics	**30-day Average a/**	**Daily Maximum a/**	**Limit Basis**
Flow, MGD	2.5	3.3	Facility Design
Total Suspended Solids, mg/L	30	45	Prev. Permit
Oil and Grease, mg/L	Report	10	CO Reg. 62
pH, s.u. b/	Report	6.5 - 9.0	CO Reg. 32
Aluminum, PD, µg/L e/	87	750	Prev. Permit
Cadmium, PD, µg/L e/ g/	0.3	7.2	CO Reg.31, 32
Cadmium, PD, µg/L e/ f/*	6.9	7.2	CO Reg.31, 32
Copper, PD, µg/L e/	64	120	CO Reg.31, 32
Iron, TREC, µg/L e/	1000	Report	CO Reg.32

Lead, PD, µg/L e/	1.5	125	CO Reg.31, 32
Manganese, TREC, µg/L	1000	Report	Prev. Permit
Mercury, TOT, µg/L c/	0.18	Report	CO Reg. 32
Silver, PD, µg/L d/ e/	0.035	9.7	CO Reg.31, 32
Selenium, TREC, µg/L e/	50.3	485	CO Reg.31, 32
Zinc, PD, µg/L e/ g/	85	98	CO Reg.31, 32
Zinc, PD, µg/L e/ f/*	758	Report	CO Reg.31, 32
There shall be no discharge of floating solids or visible foam in other than trace amounts.			

TREC- Total Recoverable Metals
TOT- Total Metals
PD- Potentially Dissolved Metals

a/ See Definitions, Part 1.1. of permit for definition of terms.
b/ Daily minimum - daily maximum limitation.
c/ Based on current approved analytical mercury method, Method 1631, Revision B, the method detection limit (MDL) for mercury is 0.0002 µg/L.
d/ Based on current approved analytical methods, the MDL for silver is 0.2 µg/L. Analytical values less than 0.2 µg/L should be reported and shall be considered in compliance with the limits.
e/ For averaging calculations of analytical results, measurements less than the MDL shall be considered as zero.
f/* Temporary modification expires 12/31/2007. These limits are valid until 12/31/07.
g/ These limits will be effective after 12/31/07. EPA may re-open this permit to revise the effluent limitations for Cd and Zn if the water quality standards are changed.

CO Reg.31 Colorado Department of Public Health and Environment Water Quality Control Commission, Regulation No. 31, *The Basic Standards and Methodologies for Surface Water,* effective December 31, 2005 (www.cdphe.state.co.us/op/regs/waterqualityregs.asp)
CO Reg.32 Colorado Department of Public Health and Environment Water Quality Control Commission, Regulation No. 32, *Classifications and Numeric Standards for Arkansas River Basin*, effective March 2, 2006. (www.cdphe.state.co.us/op/regs/waterqualityregs.asp)
CO Reg.62 Colorado Department of Public Health and Environment Water Quality Control Commission, Regulation No. 62, *Regulations for Effluent Limitations*, effective December 30, 1998. (www.cdphe.state.co.us/op/regs/waterqualityregs.asp)
Prev. Permit Permit limitations maintained from previous NPDES permit (issued January 1,

2000, on file at EPA Region 8).

Table 3. Low-Flow Season Permit Effluent Limitations

Low-Flow Season (September - April)	Discharge Limitations		
Effluent Characteristics	**30-day Average a/**	**Daily Maximum a/**	**Limit Basis**
Flow, MGD	2.5	3.3	Facility Design
Total Suspended Solids, mg/L	30	45	Prev. Permit
Oil and Grease, mg/L	Report	10	CO Reg.62
pH, s.u. b/	Report	6.5 - 9.0	CO Reg.32
Aluminum, PD, µg/L e/	87	750	Prev. Permit
Cadmium, PD, µg/L e/ g/	0.5	2.2	CO Reg.31, 32
Cadmium, PD, µg/L e/ f/*	4.3	7.5	CO Reg.31, 32
Copper, PD, µg/L e/	18.7	16.1	CO Reg.31, 32
Iron, TREC, µg/L e/	1000	Report	CO Reg.32
Lead, PD, µg/L e/	3.1	96.6	CO Reg.31, 32
Manganese, TREC, µg/L	1000	Report	Prev. Permit
Mercury, TOT, µg/L c/	0.02	Report	CO Reg.32
Silver, PD, µg/L d/ e/	0.10	4.2	CO Reg.31, 32
Selenium, TREC, µg/L e/	4.6	18.4	CO Reg.31, 32
Zinc, PD, µg/L e/ g/	146	169	CO Reg.31, 32
Zinc, PD, µg/L e/ f/*	270	Report	CO Reg.31, 32
There shall be no discharge of floating solids or visible foam in other than trace amounts.			

TREC- Total Recoverable Metals
TOT- Total Metals
PD- Potentially Dissolved

a/ See Definitions, Part 1.1. of permit for definition of terms.

b/ Daily minimum - daily maximum limitation.

c/ Based on current approved analytical mercury method, Method 1631, Revision B, the method detection limit (MDL) for mercury is 0.0002 µg/L.

d/ Based on current approved analytical methods, the MDL for silver is 0.2 µg/L. Analytical values less than 0.2 µg/L should be reported and shall be considered in compliance with the limits.

e/ For averaging calculations of analytical results, measurements less than the MDL shall be considered as zero.

f/* Temporary modification expires 12/31/2007. These limits are valid until 12/31/07.

g/ These limits will be effective after 12/31/07. EPA may re-open this permit to revise the effluent limitations for Cd and Zn if the water quality standards are changed.

CO Reg.31 Colorado Department of Public Health and Environment Water Quality Control Commission, Regulation No. 31, *The Basic Standards and Methodologies for Surface Water,* effective December 31, 2005. (www.cdphe.state.co.us/op/regs/waterqualityregs.asp)

CO Reg.32 Colorado Department of Public Health and Environment Water Quality Control Commission, Regulation No. 32, *Classifications and Numeric Standards for Arkansas River Basin*, effective March 2, 2006. (www.cdphe.state.co.us/op/regs/waterqualityregs.asp)

CO Reg.62 Colorado Department of Public Health and Environment Water Quality Control Commission, Regulation No. 62, *Regulations for Effluent Limitations*, effective December 30, 1998. (www.cdphe.state.co.us/op/regs/waterqualityregs.asp)

Prev. Permit Permit limitations maintained from previous NPDES permit (issued January 1, 2000, on file at EPA Region 8)

Table 4. Permit Effluent Monitoring Requirements

Effluent Characteristics	Monitoring Requirements		
	Monitoring Frequency	Sample Type a/	MDL, µg/L
Flow, MGD	daily	continuous	
Total Suspended Solids, mg/L c/	daily	composite	
Oil and Grease, mg/L b/	daily/weekly	visual/grab	
pH, s.u. c/	daily	continuous	
Aluminum, PD, µg/L	monthly	composite	3
Cadmium, PD, µg/L	weekly	composite	0.1
Copper, PD, µg/L	monthly	composite	1

Iron, TREC, µg/L	monthly	composite	1
Lead, PD, µg/L	weekly	composite	1
Manganese, TREC, µg/L	monthly	composite	5
Mercury, TOT, µg/L	weekly	composite	0.0002
Silver, PD, µg/L	weekly	composite	0.2
Selenium, TREC, µg/L	monthly	composite	2
Zinc, PD, µg/L	weekly	composite	10

TREC- Total Recoverable Metals
TOT- Total Metals
PD- Potentially Dissolved Metals

a/ See Definitions, Part 1.1. for definition of terms.
b/ A grab sample shall also be taken if a daily visual sheen is observed.
c/ Samples shall be collected daily when personnel are scheduled to be on site.

Table 5. Upstream & Downstream Permit Monitoring Requirements

Water Quality Parameter (at stations EF-1 and EF-2)	**Monitoring Requirements**	
	Monitoring Frequency	**Sample Type a/**
Flow, cfs	monthly	instantaneous
Hardness (as $CaCO_3$), mg/L	monthly	grab

a/ See Definitions, Part 1.1. for definition of terms.

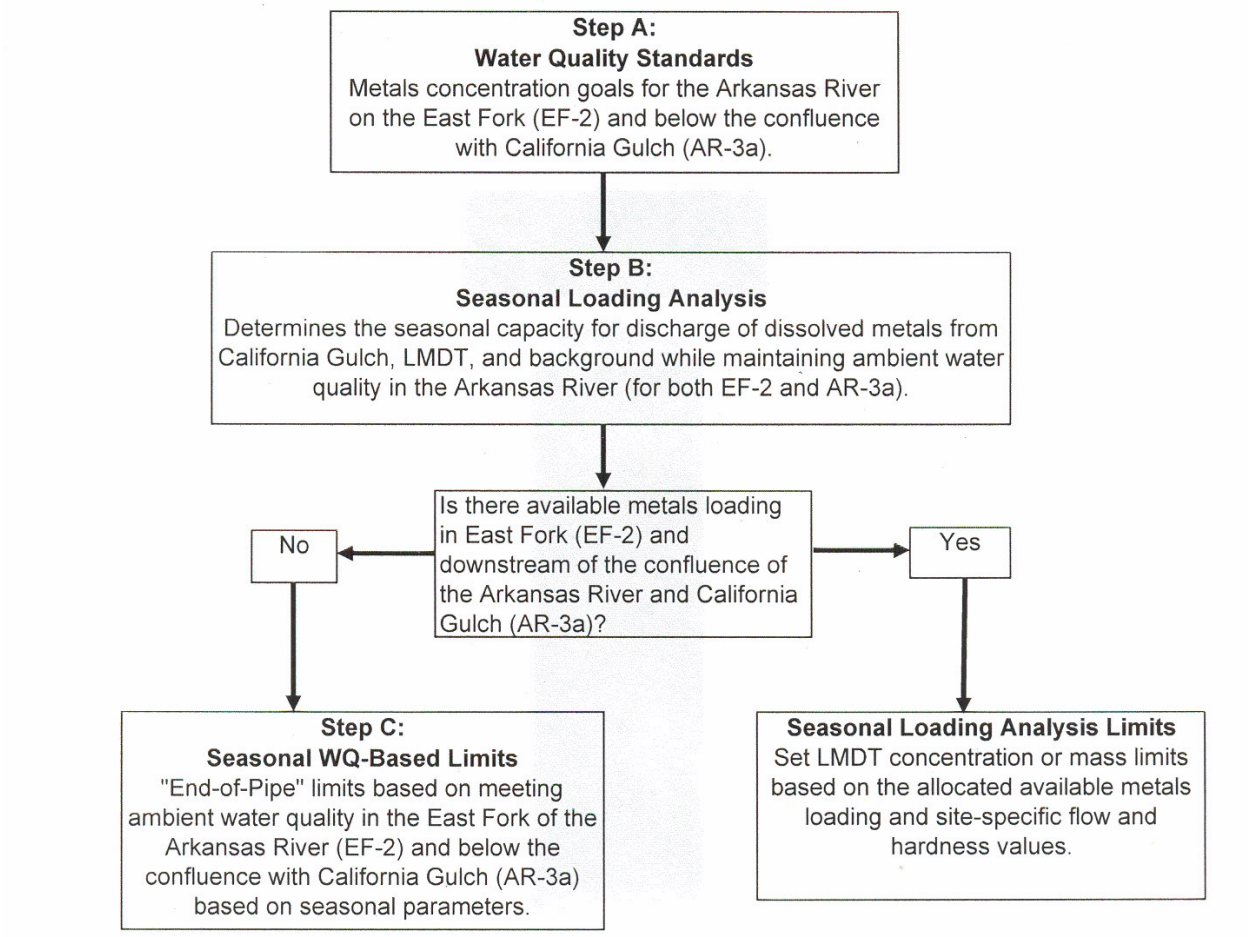
Discussion of Effluent Limitation Development

The development of effluent limitations for the LMDT Treatment Plant has been a complex and involved process. The water quality of the Upper Arkansas River has historically been negatively impacted by mining activities. Prior to construction of the LMDT Treatment Plant and the Yak Tunnel Treatment Facility, major water quality problems were observed at the confluence of the Arkansas River and California Gulch. Although the water quality problems were attributed to a variety of sources, the discharges from the two mining tunnels (Yak Tunnel and the LMDT) were thought to be the major contributors. Because both of these discharges were targeted as causing

exceedances of water quality standards at the Arkansas River/California Gulch confluence, the process of developing effluent limitations for the LMDT Treatment Plant and the California Gulch confluence was done simultaneously to ensure consistent and equitable results.

Figure 2 is the Permit Limit Development Flowchart. This figure has been formulated to visually describe the process used in developing the effluent limits for the LMDT Treatment Plant. This figure will be referred to continually as the steps involved in the effluent limitation development process are identified and explained in the following sections.

Figure 2. Effluent Limitation Development Flowchart



Since derivation of the previous effluent limitations for these facilities, additional data has become available for analysis, stream water quality has changed due to the activation of the treatment facilities and other on-going Superfund activities, and the governing Colorado Water Quality Standards have been amended. In consideration of these alterations, a coordinated reevaluation of permit limitations for the LMDT Treatment Plant was performed by EPA.

Figure 3 below represents the location of the LMDT Treatment Plant and instream water quality sampling stations used in the development of effluent limitations for the LMDT Treatment Plant.

Listed below is a detailed description of the sampling stations depicted in Figure 3.

TC-1 Located on Tennessee Creek approximately 1.25 miles upstream of the confluence with the East Fork of the Arkansas River.

EF-1 Located on the East Fork of the Arkansas River at Colorado Highway 91.

EF-2 (USGS Station 07079300) Located on the East Fork of the Arkansas River, 20 feet downstream from U.S. Highway 24, 0.35 miles downstream of the confluence with the drainage way that received discharge from the LMDT Treatment Plant and 2.2 miles upstream from the confluence with the Tennessee Creek.

CG-6 Located on California Gulch, upstream of the confluence with the Arkansas River, downstream of Malta Gulch.

AR-3a Located on the Arkansas River, approximately 370 feet downstream of the confluence with California Gulch.

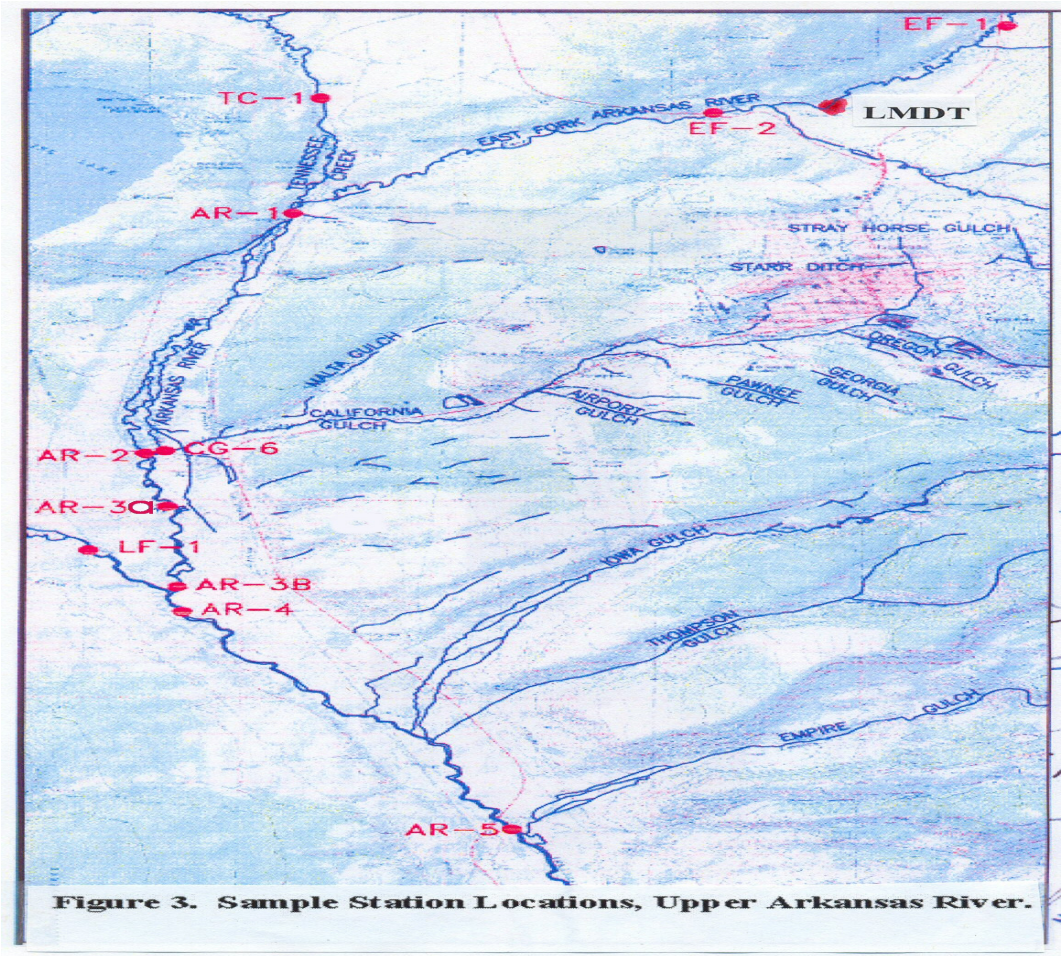


Figure 3. Sample Station Locations, Upper Arkansas River.

The permit effluent limitations were developed on a seasonal basis to accommodate the extreme

flow and hardness variations in the Upper Arkansas River Basin between seasons. The high-flow season includes the months of May through August. The low-flow season includes the months of September through April. The seasons were determined through the analysis of flow patterns, using data collected at a number of sample stations along the Upper Arkansas River.

Figure 4a below displays an analysis of flow data at sample station EF-2, along the East Fork of the Arkansas River. This plot clearly reveals the seasonal flow patterns observed throughout the Upper Arkansas River Basin.

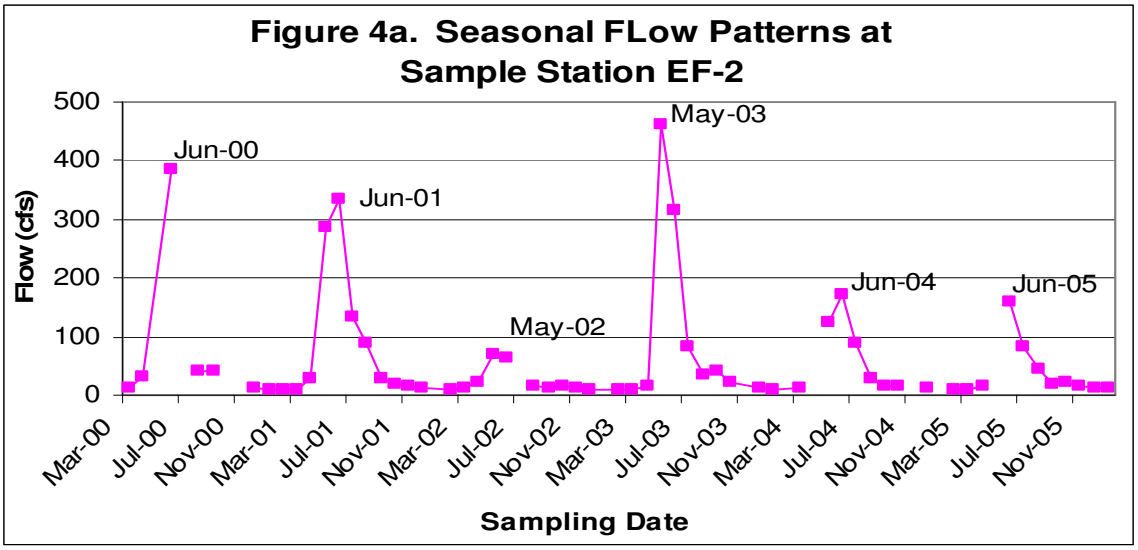
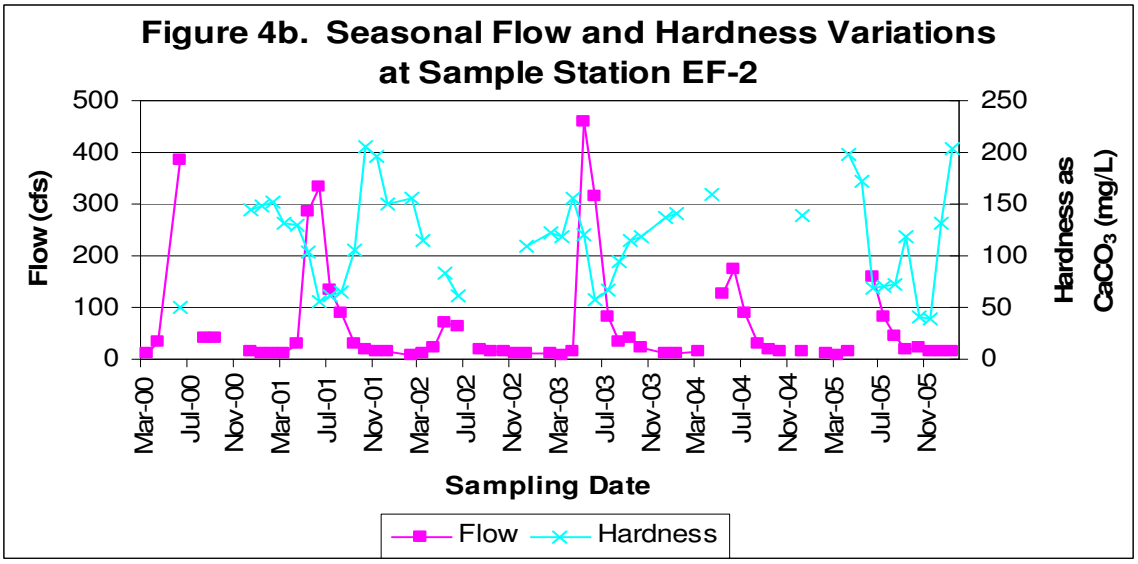
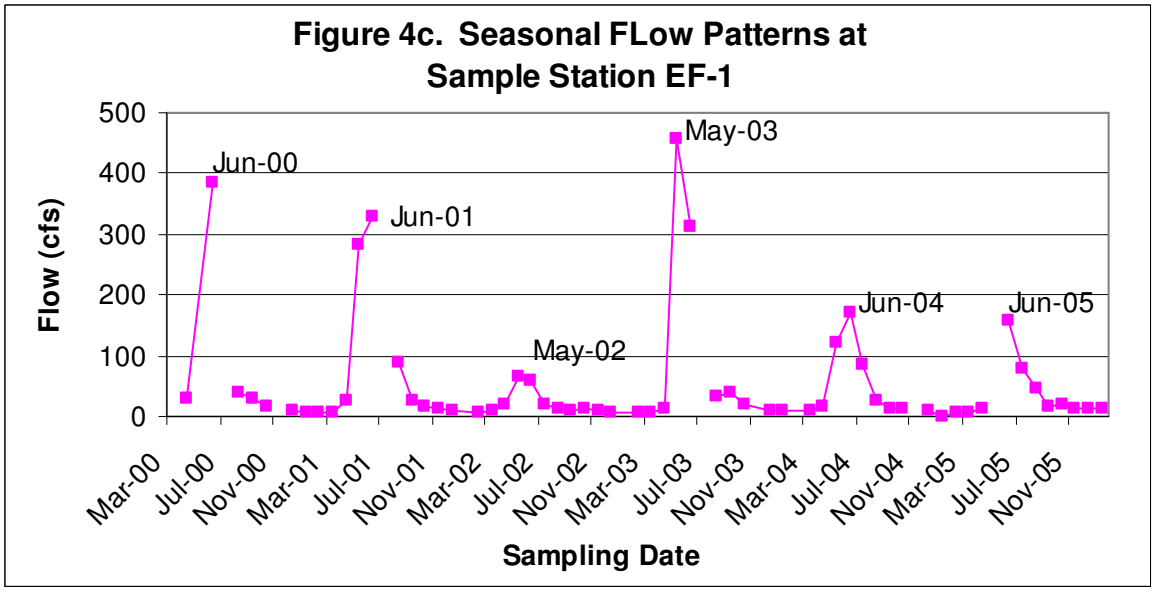


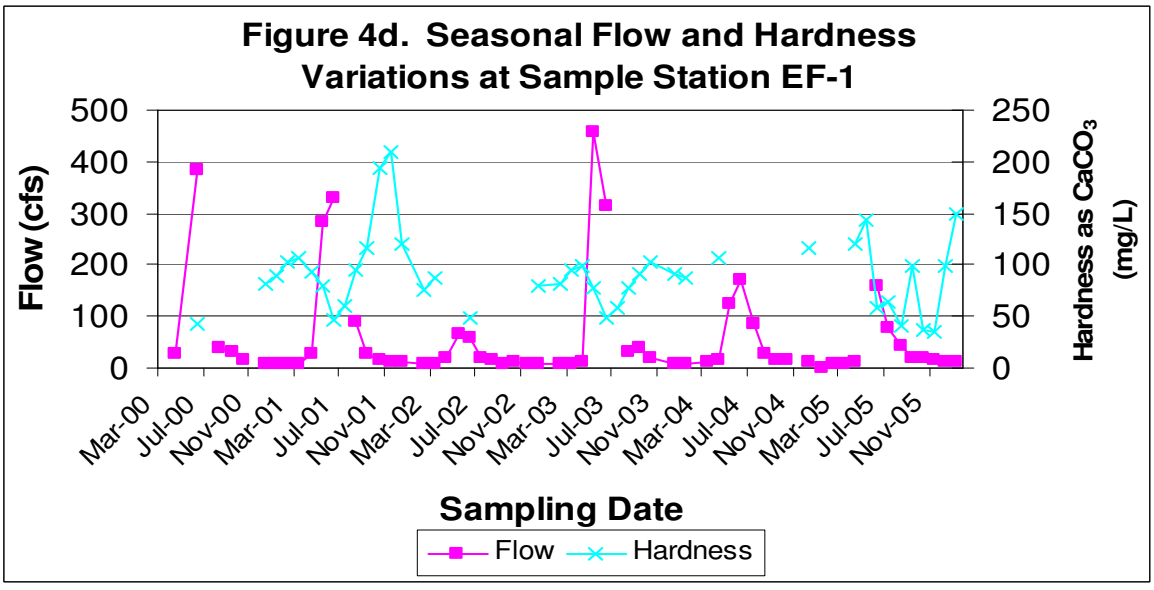
Figure 4b below portrays the inverse relationship of flow and hardness during seasonal flow periods at sample station EF-2.



Figures 4c and 4d below show similar seasonal flow patterns and the inverse relationship of flow

and hardness during seasonal flow periods at sample station EF-1. The drastic seasonal fluctuation in hardness due to flow patterns justifies the need to develop seasonal effluent limitations to adequately protect water quality throughout all seasons of the year.





The following sections will identify and explain the development process for the effluent limitations.

Water Quality Standards
(See Figure 2, Step A)

Evaluation of effluent limitations for the LMDT Treatment Plant began with review of the water quality standards and calculation of corresponding water quality criteria applicable for two locations. First location: Segment 2a of the Upper Arkansas River Basin on the East Fork. Second location: Segment 2b at the Arkansas River/California Gulch confluence. The criteria derived represent the allowable concentrations of specific chemicals in the water that are protective of human health and aquatic life. The criteria are derived to protect the designated use of the specified water body.

Water quality standards were evaluated downstream of the East Fork of the Arkansas River at sample station EF-2 and downstream of the Arkansas River/California Gulch confluence, at sample station AR-3a. These locations were chosen for analysis because Segment 2b has displayed water quality standard exceedances and discharges from LMDT Treatment Plant must not add to those exceedances. Figure 3 shows the locations of sample station EF-2 and AR-3a. Sample station EF-2 is located in Stream Segment 2a of the East Fork. Sample station AR-3a is located in Stream Segment 2b of the Upper Arkansas River Basin. The applicable designated use classifications and numeric standards for these two segments can be found in Table 1.

Calculated high-flow and low-flow numeric metal criteria at sample station EF-2 and AR-3a can be found in Appendix A: Table1a, 1b, 1c, and 1d. At sample station EF-2, a hardness of 64 mg/L (as calcium carbonate) was used in the calculation of high-flow season effluent limitations (for Cd, Cu, Pb, Ag and Zn) based on aquatic life criteria which vary with hardness. This hardness value is based on the lower 95% confidence interval of the average hardness for surface waters sampled at sample station EF-2 during the months of May through August. These hardness data were from samples collected during the period of June 2000 through August 2005.

A hardness of 121 mg/L (as calcium carbonate) was used in the calculation of low-flow season effluent limitations (for Cd, Cu, Pb, Ag and Zn) based on aquatic life criteria which vary with hardness. This hardness value is based on the lower 95% confidence interval of the average hardness for surface waters sampled at sample station EF-2 during the months of September through April. These hardness data were from samples collected during the period of December 2000 through January 2006. The data used for the hardness calculations can be found in Appendix A: Table 2a.

At sample station AR-3a, a hardness of 68 mg/L (as calcium carbonate) was used in the calculation of high-flow season effluent limitations (for Cd, Cu, Pb, Ag and Zn) based on aquatic life criteria which vary with hardness. This hardness value is based on the lower 95% confidence

interval of the average hardness for surface waters sampled during the months of May through August. These hardness data were from samples collected during the period of May 2000 through August 2005.

A hardness of 122 mg/L (as calcium carbonate) was used in the calculation of low-flow season effluent limitations (for Cd, Cu, Pb, Ag and Zn) based on aquatic life criteria which vary with hardness. This hardness value is based on the lower 95% confidence interval of the average hardness for surface waters sampled during the months of September through April. These hardness data were from samples collected during the period of January 2000 through October 2005. The data used for the hardness calculations can be found in Appendix A: Table 2b.

Seasonal Loading Analysis
(See Figure 2, Step B)

The next step in deriving effluent limitations for the LMDT Treatment Plant was to complete a seasonal loading analysis. The purpose of the loading analysis was to determine the seasonal stream capacity for various pollutants in the discharge from the LMDT Treatment Plant, while maintaining ambient water quality at the East Fork, Segment 2a (EF-2) and below the Arkansas River/California Gulch confluence, Segment 2b (AR-3a).

A LMDT Treatment Plant seasonal loading analysis was conducted using a steady-state model, based on a basic mass balance equation. This approach allows the mass of pollutants upstream of a given point to be equated with an allowable mass of pollutants downstream after complete mixing. This model assumes that pollutants are conservative and additive, and considers only dilution as a mitigating factor affecting the pollution concentration in-stream. The equations can be viewed below, as well as variable definitions.

Segment 2a, EF-2:

LMDT available loading = (Q_{EF-2} C_{EF-2} - Q_{EF-1} C_{EF-1}) * CF (Equation 1)

LMDT available loading = in-stream available loading capacity for pollutants from LMDT in lbs/day.
Q_{EF-2} = stream flow at sample station EF-2 (cfs).
C_{EF-2} = pollutant-specific water quality criteria at sample station EF-2 (µg/L).
Q_{EF-1} = stream flow at sample station EF-1 (cfs).
C_{EF-1} = background pollutant concentration at sample station EF-1 (µg/L).
CF = Unit conversion factor, 0.0053876

In-stream flow value Q_{EF-2}, used in the above mass balance equation, was calculated using the Colorado Department of Public Health and Environment's (CDPHE) modified DFLOW Model. The data were obtained from the USGS gage station 07079300 (EF-2) from 1995 to 2005. This model calculates a biological based of 1 day averaging period for 3 years(1E3) low flow for acute toxicity and a 30 day averaging period for 3 years recurrence frequency (30E3) low flow for

chronic toxicity. The DFLOW model results for Q_{EF-2} can be found in Appendix A: Table 3a. Also, the Discharge Monitoring Reports (DMR) data for EF-2 can be found in Appendix A: Table 3b. For comparison, the DFLOW model calculates a lower flow value for Q_{EF-2} than the average DMR low flow value.

Flow values for Q_{EF-1} used in the mass balance equation were calculated using flow data from monthly Discharge Monitoring Reports from the LMDT Treatment Plant. For both the chronic and acute toxicity analysis, the seasonal average discharge flow was used in the mass balance equation. An analysis of the Q_{EF-1} seasonal flow data can be found in Appendix A: Table 4a and 4b.

Background pollutant concentration values used in the mass balance equation ($\mathbf{C}_{EF-1}$) were calculated using monitoring data obtained from CDPHE. For chronic toxicity analysis, the seasonal average value for each metal parameter except Cadmium was used in the mass balance equation. For Cadmium, the CDPHE's technical analysis method for the existing quality of 85th percentile was used. For acute toxicity analysis, the 95th percentile of the seasonal maximum value was used for each sample station. An analysis of the East Fork water quality data at sample station EF-1 can be found in Appendix A: Table 5a and 5b.

Segment 2b, AR-3a:

LMDT available loading = ($Q_{AR-3a}\,C_{AR-3a} - Q_{CG-6}\,C_{CG-6} - Q_{TC-1}\,C_{TC-1} - Q_{EF-1}\,C_{EF-1}$) * CF (Equation 2)

LMDT available loading = in-stream available loading capacity for pollutants from LMDT in lbs/day.
$\mathbf{Q_{AR-3a}}$ = stream flow at sample station AR-3a (cfs).
$\mathbf{C_{AR-3a}}$ = pollutant-specific water quality criteria at sample station AR-3a (µg/L).
$\mathbf{Q_{CG-6}}$ = stream flow at sample station CG-6 (cfs).
$\mathbf{C_{CG-6}}$ = background pollutant concentration at sample station CG-6 (µg/L).
$\mathbf{Q_{TC-1}}$ = stream flow at sample station TC-1 (cfs).
$\mathbf{C_{TC-1}}$ = background pollutant concentration at sample station TC-1 (µg/L).
$\mathbf{Q_{EF-1}}$ = stream flow at sample station EF-1 (cfs).
$\mathbf{C_{EF-1}}$ = background pollutant concentration at sample station EF-1 (µg/L).
CF = Unit conversion factor, 0.0053876

Instream flow values Q_{AR-3a}, $Q_{CG-6,}$ and Q_{TC-1} used in the mass balance equation were calculated using flow data provided by Tetra-Tech RMC, a superfund contractor of CDPHE. Due to the seasonal analysis approach, an average seasonal flow was used for chronic toxicity analysis and the lower 95th percentile flow was used for acute toxicity analysis. An analysis of these three streams flow data can be found in Appendix A: Table 6a, 6b, 7a, 7b, 8a, and 8b.

Again, the flow values for Q_{EF-1} used in the mass balance equation were calculated using flow data from monthly Discharge Monitoring Reports from the LMDT Treatment Plant. For both the

chronic and acute toxicity analysis, the seasonal average discharge flow was used in the mass balance equation. An analysis of the Q_{EF-1} seasonal flow data can be found in Appendix A: Table 4a and 4b.

Background pollutant concentration values used in the mass balance equation ($\mathbf{C}_{AR-3a,}$ C_{CG-6}, and C_{TC-1}) were calculated using monitoring data obtained from Tetra-Tech RMC, a superfund contractor of CDPHE. For chronic toxicity analysis, the seasonal average value for each metal parameter except Cadmium was used in the mass balance equation. For Cadmium, the CDPHE's technical analysis method for the existing quality of 85th percentile was used. For acute toxicity analysis, the 95th percentile of the seasonal maximum value was used for each sample station. An analysis of these three streams water quality data can be found in Appendix A: Table 6a, 6b, 7a, 7b, 8a, and 8b.

Again, the background pollutant concentration values used in the mass balance equation ($\mathbf{C}_{EF-1}$) were calculated using monitoring data obtained from CDPHE. For chronic toxicity analysis, the seasonal average value for each metal parameter except Cadmium was used in the mass balance equation. For Cadmium, the CDPHE's technical analysis method for the existing quality of 85th percentile was used. For acute toxicity analysis, the 95th percentile of the seasonal maximum value was used for each sample station. An analysis of the East Fork water quality data at sample station EF-1 can be found in Appendix A: Table 5a and 5b.

The LMDT Treatment Plant available loading, equated through use of the mass balance Equation 1 and Equation 2 above, represents the extent to which pollutants can be discharged from LMDT Treatment Plant while maintaining water quality criteria at the Arkansas River/California Gulch confluence.

Results of the seasonal loading analysis using Equation 1 for sample station EF-2 in segment 2a are displayed in Appendix A: Table 9a and 9b. Results of the seasonal loading analysis using Equation 2 for sample station AR-3a in segment 2b are displayed in Appendix A: Table 10a and 10b. Finally, the results of the seasonal loading analysis of Segment 2a, EF-2, Segment 2b, AR-3a, and the water quality standard data are complied in Table 11a and Table 11b in Appendix A.

The high flow results reveal that negative stream capacity being exhibited for pollutant parameters of concern (Cd, Pb, Ag, and Zn) in Segment 2a or Segment 2b (see Table 11a). The low flow results reveal that negative stream capacity being exhibited for pollutant parameters of concern (Cd, Ag, Se, and Zn) in Segment 2a or Segment 2b (see Table 11b). The negative results indicate that there is very little or no capacity for additional pollutant loading at the Arkansas River/California Gulch confluence. Examples for seasonal loading analysis calculations of Cadmium are included in Appendix B: Exhibit 1 and 2.

Seasonal Water Quality Based Effluent Limitations
(See Figure 2, Step C)

Upon evaluation of the seasonal loading analysis results, it was deemed necessary to develop

seasonal water quality based effluent limitations (WQBELs) for the LMDT Treatment Plant permit. The seasonal loading analysis concluded that there was no capacity available at sample station AR-3a for cadmium, lead, silver, selenium or zinc. The analysis showed capacity for arsenic, copper, iron, manganese, and mercury. The WQBELs are "end-of-pipe" limitations (e.g. permitted outfall 001 or 002) based on meeting ambient water quality and protecting the designated uses of the Segment 2a, East Fork of the Arkansas River and Segment 2b. The "end-of-pipe" restrictions set a numeric limit that the plant effluent must meet before entrance into the receiving stream. The calculated seasonal WQBELs are listed in Appendix A: Table 11a and 11b. For pollutant parameters that have negative stream capacity in either segment 2a and/or segment 2b, the effluent limitations were set equal to the lower segment water quality criterion. The seasonal WQBELs were based upon the numeric standards set by the Colorado Water Quality Control Commission for segment 2a and segment 2b of the Upper Arkansas River Basin. Table 13 in Appendix A summarizes the formulas used to calculate the metal water quality criteria that are dependent on hardness.

Discussion on Permit Effluent Limitations and Monitoring Requirements

Permit effluent limitations are based upon a reasonable potential to be present in the discharge as determined from the previous discharge monitoring report data. The seasonal LMDT Treatment Plant DMR data (2000-2005) can be found in Appendix A: Table 12a and 12b.

Flow

Effluent flow limitations are based upon the facility design flows. The 30-day average limitation is based on the facility mean design flow, 2.5 MGD. The daily maximum limitation is based on the facility peak design flow of 3.3 MGD.

Total Suspended Solids (TSS)

Previous permit limits will be carried forward in the renewed permit based on the antibacksliding provisions.

Monitoring requirements for TSS remain at daily monitoring.

Aluminum

Due to the absence of numeric water quality criteria for aluminum in segment 2a of the Upper Arkansas River Basin, the effluent limitations from the previously issued permit will carry over to this permit. The continuation of the acute and chronic aluminum effluent limitations is in accordance with regulatory antibacksliding requirements of 40 CFR122.44.(l).

Aluminum monitoring will remain on a monthly basis.

Arsenic

CDPHE's "Determination of the Requirement of Include Water Quality Standards-Based Limits in CDPS Permits Based on Reasonable Potential Procedural Guidance" indicates that "recent effluent data (usually the most recent 24 months) was reviewed; if the maximum effluent concentration was less than some percentage (often 50%) of the calculated limit, then no limitation was included in the permit." The Stream Classifications and Water Quality Standards table for Segment 2a of the Upper Arkansas River indicates an arsenic effluent limitation of 50 µg/L (chronic) and no applicable acute limit. LMDT Treatment Plant DMR data indicate that almost all of the arsenic monitoring results were at detection level, 2.5 µg/L for 30-day average, and 5 µg/L for daily maximum. Based on the information above, there will not be arsenic limitation included in this permit.

Arsenic monitoring also removed for this permit.

Cadmium

Effluent limitations for cadmium will be based on temporary modification water quality standards. When the temporary modification expires on 12/31/2007, the seasonal effluent limitations will be based on WQBELs. Results of the seasonal loading analysis indicated a negative capacity for additional cadmium loading at LMDT Treatment Plant for chronic limitations in the high-flow season and in the low-flow season at segment 2b. Due to the lack of downstream capacity the seasonal loading analysis, seasonal "end-of-pipe" limits based on the hardness at sample station EF-2 have been applied to ensure water quality protection in the East Fork of the Arkansas River.

Cadmium monitoring will remain on a weekly basis.

Copper

Effluent limitations for copper will be based on WQBELs.

Copper monitoring has changed from a weekly basis to a monthly basis. The LMDT Treatment Plant monitoring data showed that the pollutant was repeatedly measured at levels well below permit limits, the monitoring requirements for copper have been reduced from weekly monitoring to monthly monitoring. Evaluation of monthly performance history was conducted in accordance to the EPA Interim Guidance For Performance-Based Reduction of NPDES Permit Monitoring Frequencies, April 1996.

Iron

Effluent limitations for iron will be based on WQBELs.

Iron monitoring will remain on a monthly basis.

Lead

Effluent limitations for lead will be based on WQBELs. Results of the seasonal loading analysis indicated a negative capacity for additional lead loading at LMDT Treatment Plant for chronic limitations in the high-flow season at both segment 2a and segment 2b. Due to the lack of downstream capacity the seasonal loading analysis, seasonal "end-of-pipe" limits based on the hardness at sample station EF-2 have been applied to ensure water quality protection in the East Fork of the Arkansas River.

Lead monitoring will remain on a weekly basis.

Manganese

The previous permit contained a total recoverable effluent limitation of 1000 µg/L for manganese. No surface water supply has been identified in segment 2a. Therefore, the monthly average limit of 1000 µg/L will be carried forward in the renewed permit based on antibacksliding provisions.

Manganese monitoring has changed from a weekly basis to a monthly basis. The LMDT Treatment Plant monitoring data (see Table 12a and 12b) showed that the pollutant was repeatedly measured at levels well below permit limits, the monitoring requirements for manganese have been reduced from weekly monitoring to monthly monitoring. Evaluation of monthly performance history was conducted in accordance to the EPA Interim Guidance For Performance-Based Reduction of NPDES Permit Monitoring Frequencies, April 1996.

Mercury

Effluent limitations for mercury are based upon WQBELs.

Mercury monitoring will remain on a weekly basis. EPA Method 1631, Revision B: Mercury in Water by Oxidation, Purge and Trap, and Cold Vapor Atomic Fluorescence Spectrometry, the minimum level of quantitation (ML) for mercury has been revised to 0.0005 µg/L. This method shall be applied to future monitoring and reporting efforts.

Silver

Effluent limitations for silver are based upon WQBELs. Results of the seasonal loading analysis indicated a negative capacity for additional silver loading at LMDT Treatment Plant for chronic limitations in the high-flow and low flow season at both segment 2a and segment 2b. Due to the lack of downstream capacity the seasonal loading analysis, seasonal "end-of-pipe" limits based

on the hardness at sample station EF-2 have been applied to ensure water quality protection in the East Fork of the Arkansas River.

Silver monitoring will remain on a weekly basis.

Selenium

Effluent limitations for selenium are based upon WQBELs. Results of the seasonal loading analysis indicated a negative capacity for additional selenium loading at LMDT Treatment Plant for chronic limitations in the low-flow season at both segment 2a and segment 2b. Due to the lack of downstream capacity from the seasonal loading analysis, the seasonal "end-of-pipe" limits based on the hardness at sample station EF-2 have been applied to ensure water quality protection in the East Fork of the Arkansas River.

Selenium monitoring will remain on a monthly basis. Analysis of DMR data revealed selenium measurements at the detection limit on a consistent basis. Evaluation of monthly performance history was conducted in accordance to the EPA Interim Guidance For Performance-Based Reduction of NPDES Permit Monitoring Frequencies, April 1996.

Zinc

Effluent limitations for zinc will be based upon on the WQBELs for the temporary modification water quality standards. When the temporary modification expires on 12/31/2007, the seasonal effluent limitations will be based on WQBELs. Results of the seasonal loading analysis indicated a negative capacity for additional zinc loading at LMDT Treatment Plant for chronic and acute limitations in the high-flow season and in the low-flow season at segment 2b. Due to the lack of downstream capacity from the seasonal loading analysis, the seasonal "end-of-pipe" limits based on the hardness at sample station EF-2 have been applied to ensure water quality protection in the East Fork of the Arkansas River.

Zinc monitoring will remain on a weekly basis.

Additional Monitoring

Instream water quality data will be necessary to better quantify and characterize water quality on the East Fork of the Arkansas River. Therefore, EPA required a special monthly monitoring condition at upstream station EF-1 and at downstream station EF-2. The monitoring requirements are flow and hardness. This monthly upstream and downstream monitoring requirement will be reinstated in the new permit and will last throughout the duration of the permit.

Upstream station EF-1 and downstream station EF-2 monitoring will be on a monthly basis.

Whole Effluent Toxicity (WET)

The LMDT Treatment Plant DMR data indicate no WET violations in the past ten years. Based on reasonable potential analysis, WET limitations and monitoring requirements will not be included in this permit.

Duration of Permit

A five year permit is proposed.

Prepared By: Qian Zhang P.E.
Date: 11/13/2006
U.S. Environmental Protection Agency

Addendum to Statement of Basis

Response to Comments

U.S. Bureau of Reclamation Leadville Mine Drainage Tunnel (LMDT) Treatment Plant
Permit No.: CO-0021717

Addendum to permit:

The previous draft permit was public noticed on December 14, 2006. The public notice closed on January 14, 2007. At that time, EPA anticipated that the Colorado Department of Public Health and Environment Water Quality Control Commission (CDPHEWQCC) will be reviewing the numeric standards and the temporary modifications for Cd and Zn before the expiration date of 12/31/2007 for segment 2b. EPA decided to issue the new permit with the new standards and temporary modifications. This new permit will be re-public notice. As a result, On August 13, 2007, CDPHEWQCC revised the cadmium and zinc numeric standards and the temporary modifications for segment 2b as follows:

Underlying Numeric Standards:
Cd(ac)= 1.136672 - (ln(hardness) * 0.041838) * e(0.9151*ln(hardness)-3.6236)
Cd(ch)= 1.101672 - (ln(hardness) * 0.041838) * e(0.9151*ln(hardness)-3.6236)
Zn(ac)= 0.978*e(0.8537[ln(hardness)]+2.2178)
Zn(ch)= 0.986*e(0.8537[ln(hardness)]+2.0469)

Temporary Modifications - type (i)
Seasonal (April –May)
no Cd(ac), Cd(ch)=1.34
no Zn(ac), Zn(ch)=649
Expiration date of 12/31/12.

These revisions can be found in Colorado Regulation 32 at the following site:

http://www.cdphe.state.co.us/regulations/wqccregs/index.html

Low Flow Data Changes:

The DFLOW value was only available for station EF-2 as stated in the seasonal loading analysis of the original fact sheet. In order to perform meaningful mass balances for both segments, 15th percentile low flow values were used to calculate acute parameters and 50th percentile low flow values were used to calculate chronic parameters (see table 3b, 4a, and 4b in Appendix A). For comparison, the DFLOW values are almost the same as the 15th percentile low flow values for the low flow season.

LMDT Concerns:

On January 12, 2007, EPA received a letter from LMDT in response to the public notice of the draft new NPDES permit. A summary of concerns are as follows:

1. The draft permit reduced the effluent limit on Cd. It appears the proposed permit revision is the result of California Gulch's influence on chemical loads to the receiving stream as opposed to that of the LMDT. It will not be reasonable to do so entirely by adjusting the permitted discharge from the LMDT. LMDT feels there are other significant contributing sources. In meeting lower effluent limits for Cd will cause substantial increase in cost to the government to operate the plant. LMDT requests in cooperation with State of Colorado Department of Public Health and Environment, EPA extend the current temporary modification standard at Segment 2b.

Response: Although the Leadville Mine Drain Tunnel (LMDT) discharges to Upper Arkansas segment 2a, the effluent limits in the EPA-issued discharge permit are based on the standards applicable to both segment 2a and 2b (per the requirements of 40 CFR 122.44(d)). Some effluent limits are based on the numeric standards, and some are based on temporary modifications. The reason is that downstream of the discharge, in segment 2b, the numeric standards for certain metals are exceeded. As described above, the CDPHEWQCC revised the cadmium and zinc numeric standards and the temporary modifications for segment 2b. The new Cd and Zn effluent limitations are calculated according to the new revision.

2. Standards based on receiving water hardness may be misleading. Receiving water quality data for hardness indicate seasonal variations of hardness in the Arkansas River above and below the LMDT. These numbers are used to calculate lower Cd limits. Because these seasonal water quality fluctuations occur in the natural stream, it is clear that heavy metal variations are beyond the control of the LMDT. Additional questions arise regarding the validity of the sample locations which are immediately adjacent to the highway. It is likely that magnesium chloride applied to roads during storms is affecting the baseline hardness value during some sample periods. If this is the case, the validity for the basis to decrease the Cd limit for the LMDT facility is questioned, as the hardness values were based on a potentially biased baseline.

Response: The hardness value is based on the lower 95% confidence interval of the average hardness for surface water sampled at sample station EF-2. The addition of magnesium chloride to the surface water should increase the hardness value. As a result, the increase hardness will increase the Cd limit.

LMDT Request for Permit Change:

On June 26, 2007, EPA received the following request from LMDT to change the permit monitoring frequency for pH and TSS to reflect the actual practice of LMDT plant personnel. The actual practice of LMDT is that they have plant personnel on site four days per week.

Response: EPA added the following footnote to modify the daily sampling frequency for pH and TSS in the monitoring requirements table: "Sample readings shall be collected daily when personnel are scheduled to be on site"

State of Colorado Comment:

The State of Colorado provided comments indicated that the receiving waters are designated as reviewable in regulation #32 and Colorado's antidegradation policy applies.

Response: CO Regulation 32 designation indicates that segment 2b of Upper Arkansas River that the September 30, 2000 baseline does not apply. The regulation further states that for segment 2b, "the Commission found that the appropriated baseline date and baseline water quality should be determined at the time that any new activity triggers anti-degradation review. Thus, the Commission adopted a revised anti-degradation baseline for segments 2b and 2c whereby the anti-degradation review and collection of water quality data shall commence upon the same date any new activity occurs in either segment 2b or 2c." Based on the regulation statement above, CDPHEWQCC agreed that the baseline water quality (BWQ) concentrations for pollutants will be based on the data set from 2000 to 2005 for the antidegradation reviews.

The Colorado's "Antidegradation Significance Determination for New or Increased Water Quality Impacts Procedural Guidance" can be found at the following site:

http://www.cdphe.state.co.us/wq/Assessment/Assess_pdf/ADGuidance.pdf

The Colorado's antidegradation guidance was used to evaluate the chronic pollutants effluent limits.

The BWQ, SCT, and ADBAC concentrations are determined based on the following equations in the antidegradation guidance:

$$BWQ = (M_{eff}Q_{eff}+M_{u/s}Q_{u/s})/(Q_{eff}+Q_{u/s}) \quad (1)$$

$$SCT = 0.15*(WQS-BWQ)+BWQ \quad (2)$$

$$ADBAC = (SCT*Q_3-M_{u/s}*Q_{u/s})/Q_d \quad (3)$$

Where:

BWQ = Baseline water quality
SCT = Significant concentration threshold
WQS = Water quality standard
ADBAC = Antidegradation-based average concentration

M_{eff} = 2000-2005 average of 30-day average effluent pollutant concentration
Q_{eff} = 2000-2005 average of 30-day average effluent flow
$M_{u/s}$ = Upstream/instream background pollutant conc. (AR-3a - LMDT, 85th %)
$Q_{u/s}$ = Upstream chronic low flow (50th percentile low flow data were used)
Q_3 = Downstream flow ($Q_{u/s}$ + Q_d)
Q_d = Average daily effluent flow (design capacity)

Tables 14 and 15 in Appendix A summarize the antidegradation analysis results of ADBAC or antidegradation based effluent limit (ADBEL), new WQBEL, and existing permit limit or non-impact limit (NIL) for both segments 2a and 2b, respectively. Table 16 in Appendix A summarizes the final effluent limitations for LMDT with the most stringent permit limits obtained from the ADBEL, WQBEL, NIL, and 2 year rolling averages between segments 2a and 2b.

Antidegradation evaluation description for each pollutant:

Aluminum
The previous limits during high and low flow season for 30-day average were 87 µg/L. The new seasonal effluent limitations for aluminum remain the same as shown in Tables 6 and 7. Since there is no increase in effluent limits, the antidegradation policy does not apply for aluminum.

Cadmium
The antidegradation policy applies for Cadmium because of increased water quality impacts during high flow(new WQBEL is greater than the existing permit limit). The final 30-day average effluent limit is 0.9 µg/L during high flow (based on the NIL). The acute limit is 1.2 µg/L.

The antidegradation policy does not apply for Cadmium during low flow (new WQBEL is less than the existing permit limit). Therefore, the final effluent limit is 1.1 µg/L during low flow (based on the new WQBEL). The acute limit is 2.9 µg/L.

Copper
The antidegradation policy applies for Copper during high flow because of increased water quality impacts (new WQBEL is greater than the existing permit limit). The final effluent limits for both 30-day average and acute are 23 µg/L during high flow (based on the WQBEL). The 2-year rolling average limit of 11 µg/L is based on the ADBEL. This limit was determined from the antidegradation analysis.

The antidegradation policy applies for Copper during low flow because of increased water quality impacts (new WQBEL is greater than the existing permit limit). The final 30-day average effluent limit is 14 µg/L (based on the NIL) and the acute limit is 25 µg/L during low flow.

Iron
The antidegradation policy does not apply for Iron during high flow (new WQBEL is less than or

equal to the existing permit limit). Therefore, the final 30-day average effluent limit is 1000 µg/L during high flow (based on the new WQBEL).

The antidegradation policy applies for Iron because of increased water quality impacts during low flow (new WQBEL is greater than the existing permit limit). The final 30-day average effluent limit is 1000 µg/L during low flow (based on the NIL).

Lead

The antidegradation policy does not apply for Lead during either high or low flow (new WQBELs are less than the existing permit limit). Therefore, the final 30-day average effluent limit is 1.5 µg/L (based on the new WQBEL) and acute limit is 32 µg/L during high flow. The final 30-day average effluent limit is 5.3 µg/L (based on the new WQBEL) and the acute limit is 140 µg/L during low flow.

Manganese

The antidegradation policy applies for Manganese because of increased water quality impacts (new WQBEL is greater than the existing permit limit) during high flow. The final 30-day average and acute effluent limits are 13300 µg/L (based on the WQBEL) during high flow. The 2-year rolling average limit of 2680 µg/L is based on the ADBEL. This limit was determined from the antidegradation analysis.

The antidegradation policy applies for Manganese because of increased water quality impacts (new WQBEL is greater than the existing permit limit) during low flow. The final 30-day average and acute effluent limits are 1000 µg/L (based on NIL) and the acute limit is 5670 µg/L during low flow.

Mercury

The antidegradation policy applies for Mercury because of increased water quality impacts (new WQBEL is greater than the existing permit limit) during high flow. The bioaccumulative toxic pollutant test was conducted for Mercury. The final 30-day average effluent limit is 0.13 µg/L (based on the WQBEL). The 2-year rolling average limit of 0.02 µg/L is based on the ADBEL. This limit was determined from the antidegradation analysis.

The antidegradation policy applies for Mercury because of increased water quality impacts (new WQBEL is greater than the existing permit limit) during low flow. The 30-day average effluent limit is 0.01 µg/L (based on the NIL).

Silver

The antidegradation policy does not apply for Silver during either high or low flow (new WQBELs are less than the existing permit limit). Therefore, the final 30-day average effluent limit is 0.035 µg/L (based on the new WQBEL) and the acute limit is 0.83 µg/L during high flow. The final 30-day average effluent limit is 0.05 µg/L (based on the new WQBEL) and the acute limit is 4.8 µg/L during low flow.

Selenium
The antidegradation policy applies for Selenium because of increased water quality impacts during high flow (new WQBEL is greater than the existing permit limit). The final 30-day average effluent limit is 35 µg/L (based on the WQBEL) and the acute limit is 87 µg/L during high flow. The 2-year rolling average limit of 7.2 µg/L is based on the ADBEL. This limit was determined from the antidegradation analysis.

The antidegradation policy does not apply for Selenium during low flow (new WQBEL is less than the existing permit limit). Therefore, the final 30-day average effluent limit is 4.6 µg/L (based on the new WQBEL) and the acute limit is 23 µg/L during low flow.

Zinc
The antidegradation policy applies for Zinc because of increased water quality impacts (new WQBEL is greater than the existing permit limit) during high flow. The final 30-day average effluent limit is 84 µg/L (based on the NIL) and the acute limit is 329 µg/L during high flow.

The antidegradation policy applies for Zinc because of increased water quality impacts (new WQBEL is greater than the existing permit limit) during low flow. The final 30-day average effluent limit is 129 µg/L (based on the NIL) and the acute limit is 284 µg/L during low flow.

As a result of the revised cadmium and zinc numeric standards, temporary modifications, and the antidegradation analysis, the revised effluent limitations are presented in tables 6 and 7 below:

Table 6: Revised high flow season effluent limitations

High-Flow Season (May - August)	**Discharge Limitations**			
Effluent Characteristics	**30-day Average a/**	**Daily Maximum a/**	**2-year Average g/**	**Limit Basis**
Flow, MGD	2.5	3.3	N/A	Facility Design
Total Suspended Solids, mg/L	30	45	N/A	Prev. Permit
Oil and Grease, mg/L	Report	10	N/A	CO Reg. 62
pH, s.u. b/	Report	6.5 - 9.0	N/A	CO Reg. 32
Aluminum, PD, µg/L e/	87	750	N/A	Prev. Permit
Cadmium, PD, µg/L e/	0.9	1.2	N/A	CO Reg.31, 32
Cadmium, PD, µg/L e/ f/*	1.2	N/A	N/A	CO Reg.31, 32

Copper, PD, µg/L e/	23	23	11	CO Reg.31, 32, antidegradation policy
Iron, TREC, µg/L e/	1000	Report	N/A	CO Reg.32
Lead, PD, µg/L e/	1.5	32	N/A	CO Reg.31, 32
Manganese, TREC, µg/L	13300	13300	2680	CO antidegradation policy
Mercury, TOT, µg/L c/	0.13	Report	0.02	CO Reg. 32, antidegradation policy
Silver, PD, µg/L d/ e/	0.035	0.83	N/A	CO Reg.31, 32
Selenium, TREC, µg/L e/	35	87	7.2	CO Reg.31, 32, antidegradation policy
Zinc, PD, µg/L e/	84	329	N/A	CO Reg.31, 32
Zinc, PD, µg/L e/ f/*	329	N/A	N/A	CO Reg.31, 32
There shall be no discharge of floating solids or visible foam in other than trace amounts.				

TREC- Total Recoverable Metals
TOT- Total Metals
PD- Potentially Dissolved Metals

a/ See Definitions, Part 1.1. of permit for definition of terms.
b/ Daily minimum - daily maximum limitation.
c/ Based on current approved analytical mercury method, Method 1631, Revision B, the method detection limit (MDL) for mercury is 0.0002 µg/L.
d/ Based on current approved analytical methods, the MDL for silver is 0.2 µg/L. Analytical values less than 0.2 µg/L should be reported and shall be considered in compliance with the limits.
e/ For averaging calculations of analytical results, measurements less than the MDL shall be considered as zero.
f/* Temporary modifications: Seasonal (April - May), expiration date of 12/31/12. If temporary modifications are not extended before the expiration date, the underlying standards will be effective at that time.
g/ Antidegradation limits apply as the average of all 30-day average data collected for months during a rolling 24-month period. These limits become effective after data has been collected for all months during the 24 months following permit issuance. .

Table 7: Revised low flow season effluent limitations

Low-Flow Season (September - April)	Discharge Limitations		
Effluent Characteristics	**30-day Average a/**	**Daily Maximum a/**	**Limit Basis**
Flow, MGD	2.5	3.3	Facility Design
Total Suspended Solids, mg/L	30	45	Prev. Permit
Oil and Grease, mg/L	Report	10	CO Reg.62
pH, s.u. b/	Report	6.5 - 9.0	CO Reg.32
Aluminum, PD, µg/L e/	87	750	Prev. Permit
Cadmium, PD, µg/L e/	1.1	2.9	CO Reg.31, 32
Cadmium, PD, µg/L e/ f/*	2.9	N/A	CO Reg.31, 32
Copper, PD, µg/L e/	14	25	CO Reg.31, 32
Iron, TREC, µg/L e/	1000	Report	CO Reg.32
Lead, PD, µg/L e/	5.3	140	CO Reg.31, 32
Manganese, TREC, µg/L	1000	5670	Prev. Permit, CO Reg. 32
Mercury, TOT, µg/L c/	0.01	Report	CO Reg.32
Silver, PD, µg/L d/ e/	0.05	4.8	CO Reg.31, 32
Selenium, TREC, µg/L e/	4.6	23	CO Reg.31, 32
Zinc, PD, µg/L e/	129	284	CO Reg.31, 32
Zinc, PD, µg/L e/ f/*	284	N/A	CO Reg.31, 32
There shall be no discharge of floating solids or visible foam in other than trace amounts.			

TREC- Total Recoverable Metals
TOT- Total Metals
PD- Potentially Dissolved

a/ See Definitions, Part 1.1. of permit for definition of terms.
b/ Daily minimum - daily maximum limitation.
c/ Based on current approved analytical mercury method, Method 1631, Revision B, the method detection limit (MDL) for mercury is 0.0002 µg/L.
d/ Based on current approved analytical methods, the MDL for silver is 0.2 µg/L. Analytical values less than 0.2 µg/L should be reported and shall be considered in compliance with

the limits.

e/ For averaging calculations of analytical results, measurements less than the MDL shall be considered as zero.

f/* Temporary modifications: Seasonal (April - May), expiration date of 12/31/12. If temporary modifications are not extended before the expiration date, the underlying standards will be effective at that time.

There are no antidegradation based 2 year rolling average effluent limits for any of the parameters in Table 7 during the low flow season.

Environmental Justice Analysis:

The environmental justice evaluation of major NPDES permitting actions has been conducted. This evaluation checklist can be found in Appendix C.

Prepared by: Qian Zhang P.E.
Reviewed by: Bruce Kent
Date: 6/10/2008
U.S. Environmental Protection Agency

Second Addendum to Statement of Basis

This permit was re-public noticed on June 26, 2008. The public notice closed on July 26, 2008. EPA did not receive any public comments during the 30 days public comment period. EPA received the 401 certification from Colorado on July 18, 2008.

EPA Region 8, Office of Enforcement, Compliance and Environmental Justice (ECEJ) provided the following information:

On 6/17/08, EPA conducted a compliance evaluation inspection (CEI) at this facility. The inspectors observed the installation of a new inflow line to the Leadville Drain Wastewater Treatment Plant (WWTP). On 6/18/08, the WWTP began treating the new flow starting with an inflow rate of 750 gallons/minute (gpm). Feed rate will gradually increase to an expected maximum flow of 1500 gpm.

The new flow is from cavity in the BOR Tunnel. The concentration of the new flow is currently similar to the source at the bulkhead. However, the WWTP representatives indicate concentration may change resulting in change to the plant process.

Prepared by: Qian Zhang P.E.
Date: 8/13/2008
U.S. Environmental Protection Agency